

IGS Uprate Project - Steam Generation and NOx Mitigation for 950 MW Operation

It has been proposed that the installation of pendant extensions with required SootBlowers (SB) and an Over Fire Air (OFA) system are required to support operation at 950 Megawatts. The installation of the following instrumentation and control capabilities and other considerations will be required for the successful implementation of these modifications:

NOx Mitigation

To safely implement staged combustion and OFA for the control and reduction of NOx emissions the following instrumentation and controls capabilities will be required¹:

1 Excess Air Measurement

Accurate measurement and control of excess air is required to ensure complete and uniform combustion while implementing NOx control methods². Capability requirements are as follows:

- 1.1 Installation of a CO Monitoring system.
- 1.2 CO system must accurately profile CO at the designated location in the gas path.
- 1.3 CO system must be capable of implementation in or integration with existing and future unit control systems at IGS to coordinate adjustments of the fuel to air stoichiometry to achieve staged but complete combustion.

2 Combustion Air Distribution Measurement and Control

Accurate measurement and control of secondary and over fire air distribution is required. Capability requirements for this are as follows:

- 2.1 Installation of a minimum of six (6) OFA ports per burner wall.³
- 2.2 Implementation of instrumentation to measure air flow at each OFA port.
- 2.3 Implementation of air flow control capability for each OFA port.
- 2.4 Implementation of accurate air flow measurement instrumentation to each burner⁴, or at minimum the capability for accurate air flow measurement to each secondary air windbox with the pressure measurement capability within the windbox to monitor air distribution to each burner⁵.

3 Fuel Flow Measurement and Control

Accurate determination of stoichiometry on a per burner basis will be required to effectively control both thermal and fuel NOx.⁶ Variations in fuel distribution between burners and the latency between feeder measurement and actual delivery to the boiler effect the need for accurate measurement of coal flows and delivery per burner.⁷ This capability shall include:

- 3.1 Fuel mass measurement capability
- 3.2 Fuel/air velocity measurement capability

4 Accurate measurement of temperature and flame profiles in the primary combustion zone.

Accurate determination of the stoichiometric profile of the primary combustion zone will be required for staged combustion control. Based on this information, adjustments to fuel/air biases can be made at either each burner or each burner level to ensure minimal NOx creation and ensure proper application of OFA for uniform and complete combustion. This capability shall include: